Facility Name: _____

SUMMARY WORKSHEET

	Activity **Some of the activities listed below are conducted routinely as part of closure. The owner or operator, however, might intend or be required to conduct certain additional activities to effect closure at the unit. Worksheets for estimating the costs of such additional activities are listed in italic type.**	Worksheet Number	Cost ($)
1.	Removal of Waste	CB-3	
2.	*Demolition and Removal of Building*	CB-4	
3.	*Demolition and Removal of Concrete Structures*	CB-5	
4.	*Removal of Containment System Components*	CB-6	
5.	*Removal of Soil*	CB-7	
6.	*Backfill*	CB-8	
7.	Decontamination	CB-9	
8.	Sampling and Analysis	CB-10	
9.	Transportation	CB-11	
10.	Treatment and Disposal	CB-12	
11.	**Subtotal of Closure Costs (Add lines 1 through 10)**		
12.	Engineering Expenses (approximately 10% of closure costs, excluding certification of closure) (Multiply line 11 by 0.10)		
13.	Certification of Closure	CB-13	
14.	**Subtotal (Add engineering expenses and cost of certification of closure to closure costs) (Add lines 11, 12, and 13)**		
15.	Contingency Allowance (approximately 20% of closure costs, engineering expenses, and cost of certification of closure) (Multiply line 14 by 0.20)		
TOTAL COST OF CLOSURE *(Add lines 14 and 15)*			**$**

The information that is entered on this inventory worksheet will be used to complete those worksheets that are appropriate for estimating the costs of closure for containment buildings. If the design characteristics of the containment building to be evaluated do not conform to the format of the worksheet below, alternative calculations may be used to determine accurately the surface areas of all structures to be decontaminated and demolished, and the volumes of all structures and materials to be removed.[a] Depending on the activities to be conducted to effect closure at the unit, it may not be necessary to complete each section of this inventory worksheet.

1	**MAXIMUM PERMITTED CAPACITY** Determine the maximum permitted capacity of the containment building to determine the cost of waste disposal.		
1.A	**Maximum Volume of Waste**		**yd^3**
2	**SURFACE AREA OF CONTAINMENT BUILDING** Calculate the surface area of the containment building to determine the cost of decontamination.		
2.A	Surface area of walls	ft^2	
2.B	Surface area of roof (If decontamination is required)	ft^2	
2.C	Surface area of floor	ft^2	
2.D	**Surface Area of Building (Add lines 2.A, 2.B, and 2.C)**		**ft^2**
3	**VOLUME OF CONTAINMENT BUILDING** Demolition and removal of the containment building is an additional activity that might be conducted if the owner or operator intends to demolish and remove the building at the time of closure. Calculate the volume of the containment building to determine the costs of demolition and removal.		
3.A	Thickness of walls	ft	
3.B	Volume of walls (Multiply line 2.A by line 3.A)	ft^3	
3.C	Thickness of roof	ft	
3.D	Volume of roof (Multiply line 2.B by line 3.C)	ft^3	
3.E	**Volume of Containment Building (Add lines 3.B and 3.D)**		**ft^3**

4 VOLUME OF FLOOR

Demolition and removal of the floor is an additional activity that might be conducted if the owner or operator intends to demolish and remove the floor at the time of closure. Calculate the volume of the floor to determine costs for demolition and removal.

4.A	Thickness of floor	ft	
4.B	**Volume of Floor (Multiply line 2.C by line 4.A)**		**ft^3**
4.C	**Volume of Floor in yd^3 (Divide line 4.B by 27)**		**yd^3**

5 AREA OF GEOMEMBRANE LINERS

Removal of geomembrane liners is an additional activity that might be conducted if the owner or operator intends to remove the liners at the time of closure. Calculate the area of all geomembrane liners to determine the cost of removing those liners.

5.A	Length (Add the lengths of all liners)	ft	
5.B	Width (Add the widths of all liners)	ft	
5.C	**Area of Geomembrane Liners (Multiply line 5.A by line 5.B)**		**ft^2**

6 VOLUME OF DRAINAGE SYSTEM MATERIALS

Removal of drainage system materials is an additional activity that might be conducted if the owner or operator intends to remove those materials at the time of closure. Calculate the volume of the drainage layers of the leachate collection and removal and leak detection systems to determine the cost of removing those materials.

6.A	Length (Add the lengths of all layers)	ft	
6.B	Width (Add the widths of all layers)	ft	
6.C	Thickness (Add the thicknesses of all layers)	ft	
6.D	**Volume of Drainage System Materials (Multiply line 6.A by line 6.B by line 6.C)**		**ft^3**
6.E	**Volume of Drainage System Materials in yd^3 (Divide line 6.D by 27)**		**yd^3**

7 SURFACE AREA OF OTHER STRUCTURES

Demolition of other structures is an additional activity that might be conducted if the owner or operator intends to remove the structures at the time of closure. Calculate the surface area of all other structures that will be decontaminated or demolished at the time of closure (for example, ramps and sumps).

7.A	**Surface Area of Other Structures**	**ft^2**
7.B	**Surface Area of Other Structures in yd^2 (Divide line 7.A by 9 ft^2/yd^2)**	**yd^2**

8 VOLUME OF OTHER STRUCTURES

Removal of other structures is an additional activity that might be conducted if the owner or operator intends to remove the structures at the time of closure. Calculate the volume of all other structures that will be removed at the time of closure.

8	**Volume of Other Structures**	**yd^3**

9 VOLUME OF LEACHATE

Estimate the volume of leachate to be removed from sumps and catch basins at the time of closure. Removal of leachate is an additional activity that might be conducted if the removal of leachate will be required at the time of closure. Information about the volume of leachate will be used to determine costs for transportation and treatment and disposal.

9	**Volume of Leachate**	**yd^3**

10 VOLUME OF CONTAMINATED SOIL TO BE REMOVED Removal of contaminated soil is an additional activity that might be conducted if such removal will be required at the time of closure. Calculate the volume of contaminated soil to be removed.			
10.A	Length	ft	
10.B	Width	ft	
10.C	Depth	ft	
10.D	**Volume of Contaminated Soil to be Removed (Multiply line 10.A by line 10.B by line 10.C)**		**ft^3**
10.E	**Volume of Contaminated Soil to be Removed in yd^3 (Divide line 10.D by 27)**		**yd^3**

Notes:

[a] For example, if each of the walls of a containment building are of different thicknesses, the user would be unable to calculate the volume of the containment building by using the method prescribed in section 3 of this inventory worksheet. Rather, custom calculations would be used to calculate the volume of the containment building on the basis of the thickness of each wall.

1	Maximum volume of waste to be removed (Enter from Worksheet CB-2, line 1.A)	yd^3	
2	Level of PPE assumed for this activity (protection level D, C, or B)[a]	level of PPE	
3	Labor and equipment cost per work hour[b]	$	
4	Work rate to remove one yd^3 of waste[c]	work hr/yd^3	
5	Number of hours required to remove waste (Multiply line 1 by line 4) (One hour minimum; round up to the half-hour)	work hrs	
6	Subtotal of labor and equipment costs to remove waste (Multiply line 3 by line 5)		$
7	Number of debris box containers needed to hold waste (Divide line 1 by 20 yd^3 per container; round up to the nearest whole number)	containers	
8	Cost of one 20-yd^3-capacity debris box container (rent per week)	$ /container	
9	Cost of containers (Multiply line 7 by line 8)		$
10	Cost of mobilization and demobilization (flat rate)		$
	TOTAL COST OF REMOVAL OF WASTE (Add lines 6, 9, and 10) (Enter total on Worksheet CB-1, line 1)		**$**

Notes:

[a] Because workers encumbered by health and safety equipment cannot perform activities as quickly as workers who are not so encumbered, requirements for higher levels of PPE will reduce the productivity of labor and equipment. PPE requirements therefore should be taken into account in determining the work rate and the total number of hours required to conduct each activity.

[b] Enter the estimated cost per work hour of all labor and equipment needed to remove waste from the unit.

[c] Enter the estimated number of work hours required to remove one yd^3 of waste. If, for example, it is estimated that it will take ten minutes to remove each yd^3 of waste at the unit, enter a work rate of 0.167 (10 divided by 60) for removing the waste. If an estimate of the total number of hours required to remove the waste from the unit has already been formulated, you may bypass this step and enter that number directly on line 5.

1	Volume of the containment building (Enter from worksheet CB-2, line 3.E)	ft^3	
2	Level of PPE assumed for this activity (protection level D, C, or B)[a]	level of PPE	
3	Labor and equipment cost per work hour[b]	$	
4	Work rate to demolish and remove one ft^3[c]	work hr/ft^3	
5	Number of hours required to demolish and remove the containment building (Multiply line 1 by line 4) (One hour minimum; round up to the half-hour)	work hrs	
6	Subtotal of labor and equipment costs to demolish and remove the containment building (Multiply line 3 by line 5)		$
7	Number of debris box containers needed to hold building rubble (Divide line 1 by 180 ft^3 per container (20 yd^3 capacity); round up to the nearest whole number)	containers	
8	Cost of one 20-yd^3-capacity debris box container (rent per week)	$ /container	
9	Cost of containers (Multiply line 7 by line 8)		$
10	Cost of mobilization and demobilization (flat rate)		$
TOTAL COST OF DEMOLITION AND REMOVAL OF BUILDING (Add lines 6, 9, and 10) (Enter total on Worksheet CB-1, line 2)			**$**

Notes:

[a] Because workers encumbered by health and safety equipment cannot perform activities as quickly as workers who are not so encumbered, requirements for higher levels of PPE will reduce the productivity of labor and equipment. PPE requirements therefore should be taken into account in determining the work rate and the total number of hours required to conduct each activity.

[b] Enter the estimated cost per work hour of all labor and equipment needed to demolish and remove the building.

[c] Enter the estimated number of work hours required to demolish and remove one ft^3 of the containment building. If, for example, it is estimated that it will take 10 minutes to demolish and remove each ft^3 of the building, enter a work rate of 0.167 (10 divided by 60) for removing the building. If an estimate of the total number of hours required to demolish and remove the building has already been formulated, you may bypass this step and enter that number directly on line 5.

CONTAINMENT BUILDINGS CB-5

DEMOLITION AND REMOVAL OF CONCRETE STRUCTURES - Page 1 of 2

1 DEMOLITION OF CONCRETE STRUCTURES

1.A	Area of structures (Enter from Worksheet CB-2; add lines 2.C and 7.A as appropriate)	ft^2	
1.B	Level of PPE assumed for this activity (protection level D, C, or B)[a]	level of PPE	
1.C	Labor and equipment cost per work hour[b]	$	
1.D	Work rate to demolish one ft^2 of structures[c]	work hr/ft^2	
1.E	Number of hours required to demolish the structures (Multiply line 1.A by line 1.D) (One hour minimum; round up to the half-hour)	work hrs	
1.F	**Cost to Demolish Concrete Structures (Multiply line 1.C by line 1.E)**		**$**
2	**REMOVAL AND LOADING OF CONCRETE STRUCTURES**		
2.A	Volume of materials (Enter from worksheet CB-2; add lines 4.C and 8 as appropriate)	yd^3	
2.B	Level of PPE assumed for this activity (protection level D, C, or B)[a]	level of PPE	
2.C	Labor and equipment cost per work hour[d]	$	
2.D	Work rate to remove and load one yd^3[e]	work hr/yd^3	
2.E	Number of hours required to remove and load structures (Multiply line 2.A by line 2.D) (One hour minimum; round up to the half-hour)	work hrs	
2.F	Subtotal of labor and equipment costs to remove and load structures (Multiply line 2.C by line 2.E)		$
2.G	Number of debris box containers needed to hold structures (Divide line 2.A by 20 yd^3 per container; round up to the nearest whole number)	containers	
2.H	Cost of one 20-yd^3-capacity debris box container (rent per week)	$ /container	

2.I	Cost of containers (Multiply line 2.G by line 2.H)	$
2.J	Cost of mobilization and demobilization (flat rate)	$
2.K	**Cost to Remove and Load Structures (Add lines 2.F, 2.I, and 2.J)**	$
TOTAL COST OF DEMOLITION AND REMOVAL OF CONCRETE STRUCTURES (Add lines 1.F, and 2.K) (Enter total on Worksheet CB-1, line 3)		**$**

Notes:

[a] Because workers encumbered by health and safety equipment cannot perform activities as quickly as workers who are not so encumbered, requirements for higher levels of PPE will reduce the productivity of labor and equipment. PPE requirements therefore should be taken into account in determining the work rate and the total number of hours required to conduct each activity.

[b] Enter the estimated cost per work hour of all labor and equipment needed to demolish concrete structures at the unit.

[c] Enter the estimated number of work hours required to demolish one ft^2 of concrete structures. If, for example, it is estimated that it will take 10 minutes to demolish each ft^2 of concrete structures, enter a work rate of 0.167 (10 divided by 60) for demolishing the structures. If an estimate of the total number of hours required to demolish the structures has already been formulated, you may bypass this step and enter that number directly on line 1.E.

[d] Enter the estimated cost per work hour of all labor and equipment needed to remove and load concrete structures at the unit.

[e] Enter the estimated number of work hours required to remove and load one yd^3 of concrete structures. If, for example, it is estimated that it will take 10 minutes to remove and load each yd^3 of concrete structures, enter a work rate of 0.167 (10 divided by 60) for removing and loading the structures. If an estimate of the total number of hours required to remove and load concrete structures has already been formulated, you may bypass this step and enter that number directly on line 2.E.

1	**REMOVAL AND LOADING OF GEOMEMBRANE LINERS**		
1.A	Area of geomembrane liners (Enter from Worksheet CB-2, line 5.C)	ft^2	
1.B	Level of PPE assumed for this activity (protection level D, C, or B)[a]	level of PPE	
1.C	Labor and equipment cost per work hour[b]	$	
1.D	Work rate to remove one ft^2[c]	work hr/ft^2	
1.E	Number of hours required to remove geomembrane liner(s) (Multiply line 1.A by line 1.D) (One hour minimum; round up to the half-hour)	work hrs	
1.F	Subtotal of labor and equipment costs to remove geomembrane liner(s) (Multiply line 1.C. by line 1.E)		$
1.G	Number of drums required to package geomembrane liners for removal (Divide line 1.A by 108 ft^2; round up to the nearest whole number)	drums	
1.H	Cost of one drum	$ /drum	
1.I	Cost of drums (Multiply line 1.G by line 1.H)		$
1.J	Cost of mobilization and demobilization (flat rate)		$
1.K	**Cost to Remove Geomembrane Liners (Add lines 1.F, 1.I, and 1.J)**		**$**
2	**REMOVAL AND LOADING OF DRAINAGE SYSTEM MATERIALS**		
2.A	Volume of drainage system materials (Enter from Worksheet CB-2, line 6.E)	yd^3	
2.B	Level of PPE assumed for this activity (protection level D, C, or B)[a]		
2.C	Labor and equipment cost per work hour[d]	$	
2.D	Work rate to remove one yd^3[e]	work hr/yd^3	

2.E	Number of hours required to remove drainage system materials (Multiply line 2.A by line 2.D) (One hour minimum; round up to the half-hour)	work hrs	
2.F	Subtotal of labor and equipment costs to remove drainage system materials (Multiply line 2.C by line 2.E)		$
2.G	Number of debris box containers needed to hold drainage system materials (Divide line 2.A by 20 yd^3 per container; round up to the nearest whole number)	containers	
2.H	Cost of one 20-yd^3-capacity debris box container (rent per week)	$ /container	
2.I	Cost of containers (Multiply line 2.G by line 2.H)		$
2.J	Cost of mobilization and demobilization (flat rate)		$
2.K	**Cost to Remove Drainage System Materials (Add lines 2.F, 2.I, and 2.J)**		**$**
	TOTAL COST OF REMOVAL OF CONTAINMENT SYSTEM COMPONENTS (Add lines 1.K and 2.K) (Enter total on Worksheet CB-1, line 4)		**$**

Notes:

[a] Because workers encumbered by health and safety equipment cannot perform activities as quickly as workers who are not so encumbered, requirements for higher levels of PPE will reduce the productivity of labor and equipment. PPE requirements therefore should be taken into account in determining the work rate and the total number of hours required to conduct each activity.

[b] Enter the estimated cost per work hour of all labor and equipment needed to remove and load geomembrane liners.

[c] Enter the estimated number of work hours required to remove and load one ft^2 of geomembrane liners. If, for example, it is estimated that it will take 10 minutes to remove and load each ft^2 of geomembrane liners, enter a work rate of 0.167 (10 divided by 60) for removing and loading the liners. If an estimate of the total number of hours required to remove and load the geomembrane liners has already bee formulated, you may bypass this step and enter that number directly on line 1.E.

[d] Enter the estimated cost per work hour of all labor and equipment needed to remove and load drainage system materials.

[e] Enter the estimated number of work hours required to remove and load one yd^3 of drainage system materials. If, for example, it is estimated that it will take 10 minutes to remove and load each yd^3 of drainage system materials, enter a work rate of 0.167 (10 divided by 60) for removing and loading the materials. If an estimate of the total number of hours required to remove drainage system materials has already been formulated, you may bypass this step and enter that number directly on line 2.E.

1	Volume of contaminated soil to be removed (Enter from worksheet CB-2, line 10.E)	yd^3	
2	Level of PPE assumed for this activity (protection level D, C, or B)[a]	level of PPE	
3	Labor and equipment cost per work hour[b]	$	
4	Work rate required to remove one yd^3[3,c]	work hr/yd^3	
5	Number of hours required to remove soil (Multiply line 1 by line 4) (One hour minimum; round up to the half-hour)	work hrs	
6	Subtotal of labor and equipment costs to remove soil (Multiply line 3 by line 5)		$
7	Number of debris box containers needed to hold soil (Divide line 1 by 20 yd^3 per container; round up to the nearest whole number)	containers	
8	Cost of one 20-yd^3-capacity debris box container (rent per week)	$ /container	
9	Cost of containers (Multiply line 7 by line 8)		$
10	Cost of mobilization and demobilization (flat rate)		$
	TOTAL COST OF REMOVAL OF SOIL (Add lines 6, 9, and 10) (Enter total on Worksheet CB-1, line 5)		**$**

Notes:

[a] Because workers encumbered by health and safety equipment cannot perform activities as quickly as workers who are not so encumbered, requirements for higher levels of PPE will reduce the productivity of labor and equipment. PPE requirements therefore should be taken into account in determining the work rate and the total number of hours required to conduct each activity.

[b] Enter the estimated cost per work hour of all labor and equipment needed to remove soil.

[c] Enter the estimated number of work hours required to remove one yd^3 of soil. If, for example, it is estimated that it will take 10 minutes to remove and load each yd^3 of soil, enter a work rate of 0.167 (10 divided by 60) for removing the soil. If an estimate of the total number of hours required to remove soil has already bee formulated, you may bypass this step and enter that number directly on line 5.

To calculate costs for backfilling, an estimate of the total volume of fill material required must be provided. Add the volumes of all subsurface materials removed to determine the total volume of fill material needed.

1	Volume of fill (Enter from worksheet CB-2; add lines 4.C, 6.E, and 10.E, as appropriate)[a]	yd^3	
2	Compaction factor[b]		
3	Volume of additional fill required because of compaction factor (Multiply line 1 by line 2)	yd^3	
4	Total volume of fill needed (Add lines 1 and 3) (One yd^3 minimum; round up to the nearest whole number)	yd^3	
5	Level of PPE assumed for this activity (protection level D, C, or B)[c]	level of PPE	
6	Labor, material, and equipment cost per yd^3[d]	$ /yd^3	
7	Subtotal of labor, material, and equipment costs to backfill (Multiply line 4 by line 6)		$
8	Cost of mobilization and demobilization (flat rate)		$
TOTAL COST OF BACKFILL (Add lines 7 and 8) (Enter total on Worksheet CB-1, line 6)			**$**

Notes:

[a] If the structures, or portions of the structures, identified in sections 7 and 8 of the inventory worksheet are below the ground surface, the additional volumes of fill that will be required should be added to this estimate.

[b] Enter an appropriate factor in the form of a decimal (for example, 0.25) to account for the compaction of fill material. U.S. Environmental Protection Agency, *Final Guidance Manual: Cost Estimates for Closure and Post-Closure Plans (Subparts G and H)*, January 1987, EPA/530-SW-87-009, Volume III, pg. 7-10 suggests a compaction factor for native soil for slope and fill of 0.25.

[c] Because workers encumbered by health and safety equipment cannot perform activities as quickly as workers who are not so encumbered, requirements for higher levels of PPE will reduce the productivity of labor and equipment. PPE requirements therefore should be taken into account in determining the work rate and the total number of hours required to conduct each activity.

[d] Enter the estimated cost per yd^3 of fill material of all labor and equipment needed to conduct backfilling.

DECONTAMINATION SUMMARY SHEET - Page 1 of 1

Facility Name: _____

DECONTAMINATION SUMMARY WORKSHEET

	Activity	Worksheet Number	Cost ($)
1.	Decontamination of Unit by Steam Cleaning or Pressure Washing	CB-9A	
2.	Decontamination of Unit by Sandblasting	CB-9B	
3.	Decontamination of Heavy Equipment	CB-9C	
TOTAL COST OF DECONTAMINATION ***(Add lines 1, 2, and 3)*** ***(Enter total on Worksheet CB-1, line 7)***			**$**

1	Area of unit to be decontaminated; (Enter from Worksheet CB-2; add lines 2.D and 7.A)	ft^2	
2	Level of PPE assumed for this activity (protection level D, C, or B)[a]	level of PPE	
3	Labor and equipment cost per work hour[b]	$	
4	Work rate to steam clean or pressure wash one ft^2[2,c]	work hrs/ft^2	
5	Number of hours required to steam clean or pressure wash the unit (Multiply line 1 by line 4) (One hour minimum; round up to the half-hour)	work hrs	
6	Subtotal of labor and equipment costs to decontaminate the unit by steam cleaning or pressure washing (Multiply line 3 by line 5)		$
7	Volume of decontamination fluid (Multiply line 1 by 4 gal/ft^2)[d] (The decontamination fluids generated may be disposed of in drums or as bulk liquid. If the volume is too large to be handled effectively by placement in drums, use worksheet CB-12B to calculate the cost of transportation and disposal. If the decontamination fluids are to be placed in drums, complete lines 8 through 10.)	gal	
8	Number of drums required to contain decontamination fluid for removal (Divide line 7 by 55 gallons per drum; round up to the nearest whole number)	drums	
9	Cost of one drum	$ /drum	
10	Cost of drums needed to contain decontamination fluid (Multiply line 8 by line 9)		$
	TOTAL COST OF DECONTAMINATION OF UNIT BY STEAM CLEANING OR PRESSURE WASHING (For bulk liquids, enter from line 6. For liquids in drums, add lines 6 and 10.) (Enter total on Worksheet CB-9, line 1)		**$**

Remember to calculate costs for transporting, treating, and disposing of all decontamination fluids in drums that are generated from this activity, using worksheets CB-11 and CB-12A, respectively. If decontamination fluids are to be managed as a bulk liquid, use Worksheet CB-12B.

DECONTAMINATION OF UNIT BY STEAM CLEANING OR PRESSURE WASHING - Page 2 of 2

Notes:

[a] *Because workers encumbered by health and safety equipment cannot perform activities as quickly as workers who are not so encumbered, requirements for higher levels of PPE will reduce the productivity of labor and equipment. PPE requirements therefore should be taken into account in determining the work rate and the total number of hours required to conduct this activity.*

[b] *Enter the estimated cost per work hour of all labor and equipment needed to decontaminate the unit by steam cleaning or pressure washing.*

[c] Enter the estimated number of work hours required to steam clean or pressure wash one ft^2 of surface area. If, for example, it is estimated that it will take 10 minutes to steam clean or pressure wash one ft^2 of surface area, enter a work rate of 0.167 (10 divided by 60) for steam cleaning or pressure washing the unit. If an estimate of the total number of hours required to decontaminate the unit has already been formulated, you may bypass this step and enter that number directly on line *5*.

[d] U.S. Environmental Protection Agency, *Final Guidance Manual: Cost Estimates for Closure and Post-Closure Plans (Subparts G and H)*, November 1986, EPA/530-SW-87-009, Volume III, pg. 5-3. *The generation rate provided is recommended for this activity. However, alternative generation rates also may be used, if appropriate.*

1	Area of unit to be decontaminated (Enter from Worksheet CB-2; add lines 2.D and 7.A)	ft^2	
2	Level of PPE assumed for this activity (protection level D, C, or B)[a]	level of PPE	
3	Labor and equipment cost per work hour[b]	$	
4	Work rate to sandblast one ft^2[,c]	work hrs/ft^2	
5	Number of hours required to sandblast the unit (Multiply line 1 by line 4) (One hour minimum; round up to the half-hour)	work hrs	
6	Subtotal of labor and equipment cost to decontaminate unit by sandblasting (Multiply line 3 by line 5)		$
7	Volume of material used for sandblasting (Multiply line 1 by 2 lbs/ft^2)[d]	lbs	
8	Number of drums required to contain decontamination sands for removal (Divide line 7 by 808.89 lbs per drum; round up to the nearest whole number)[e]	drums	
9	Cost of one drum	$ /drum	
10	Cost of drums needed to contain decontamination sands (Multiply line 8 by line 9)		$
TOTAL COST OF DECONTAMINATION OF UNIT BY SANDBLASTING (Add lines 6 and 10) (Enter total on Worksheet CB-9, line 2)			**$**

Notes:

[a] *Because workers encumbered by health and safety equipment cannot perform activities as quickly as workers who are not so encumbered, requirements for higher levels of PPE will reduce the productivity of labor and equipment. PPE requirements therefore should be taken into account in determining the work rate and the total number of hours required to conduct this activity.*

[b] *Enter the estimated cost per work hour of all labor and equipment needed to decontaminate the unit by sand blasting.*

[c] Enter the estimated number of work hours required to sandblast one ft^2 of surface area. If, for example, it is estimated that it will take 10 minutes to sandblast one ft^2 of surface area, enter a work rate of 0.167 (10 divided by 60) for sandblasting the unit. If an estimate of the total number of hours required to sandblast the unit has already been formulated, you may bypass this step and enter that number directly on line *5*.

[d] U.S. Environmental Protection Agency, *Final Guidance Manual: Cost Estimates for Closure and Post-Closure Plans (Subparts G and H)*, January 1987, EPA/530-SW-87-009, Volume III, pg. 5-3. The generation rate provided is recommended for this activity. However, alternative generation rates also may be used, if appropriate.

[e] Unit weight of medium sand, on average, equals 110 lbs/ft3. Using the conversions of 0.1337 ft^3/gal and 55-gal/drum, the calculation is: 110 lbs/ft^3 x 0.1337 ft^3/gal x 55 gal/drum = 808.89 lb/drum.

1	Number of hours needed to decontaminate all heavy equipment used during closure of the unit (Enter from Page 3 of 3 of this worksheet)	work hrs	
2	Cost of steam cleaner rental per hour	$ /hr	
3	Subtotal steam cleaner rental costs (Multiply line 1 by line 2)		$
4	Level of PPE assumed for this activity (protection level D, C, or B)[a]	level of PPE	
5	Labor cost per work hour[b]	$	
6	Subtotal of labor costs (Multiply line 1 by line 5)		$
7	Volume of decontamination fluid (Multiply line 1 by 100 gallons per hour) (The decontamination fluids generated may be disposed of in drums or as bulk liquid. If the volume is too large to be handled effectively by placement in drums, use worksheet CB-12B to calculate the cost of transportation, treatment, and disposal. If the decontamination fluids are to be placed in drums, complete lines 8 through 10.)	gal	
8	Number of drums required to contain decontamination fluid for removal (Divide line 7 by 55 gallons per drum and round up to the nearest whole number)	drums	
9	Cost of one drum	$ /drum	
10	Cost of drums (Multiply line 8 by line 9)		$
11	Cost of construction of temporary decontamination area for heavy equipment (Include this cost if no permanent decontamination area exists) **NOTE: THIS COST USUALLY WILL BE INCURRED ONLY ONCE FOR THE CLOSURE OF ALL UNITS**		$

12	Cost of demolition of temporary decontamination area for heavy equipment (Include this cost if no permanent decontamination area exists) **NOTE: THIS COST USUALLY WILL BE INCURRED ONLY ONCE FOR THE CLOSURE OF ALL UNITS**	$
	TOTAL COST OF DECONTAMINATION OF HEAVY EQUIPMENT (Add lines 3, 6, 10, 11, and 12) (Enter total on Worksheet CB-9, line 3)	**$**

Remember to calculate costs for transporting, treating, and disposing of all wastes in drums that are generated from this activity, using worksheets CB-11 and CB-12A, respectively. If decontamination fluids are to be managed as a bulk liquid, use Worksheet CB-12B.

Notes:

[a] *Because workers encumbered by health and safety equipment cannot perform activities as quickly as workers who are not so encumbered, requirements for higher levels of PPE will reduce the productivity of labor and equipment. PPE requirements therefore should be taken into account in determining the work rate and the total number of hours required to conduct this activity.*

[b] *Enter the estimated cost per work hour of all labor required to decontaminate heavy equipment.*

Decontamination Times for Heavy Equipment[a]
Reference for Line 1

Use the following estimates of time to calculate the total number of hours needed to decontaminate all heavy equipment that will be used for closure activities.

Equipment	Decontamination Time (Hours)
Forklift	1
Rotary disc	1
Tractor	2
Tank wagon	2
Front-end loader	3
Dozer	3
Backhoe	3
Front shovel	3

Notes:

[a] U.S. Environmental Protection Agency, *Final Guidance Manual: Cost Estimates for Closure and Post-Closure Plans (Subparts G and H)*, January 1987, EPA/530-SW-87-009, Volume III, pg. 5-2. Decontamination times provided for specific pieces of equipment are recommended for this activity. However, alternative times also may be used, if appropriate.

SAMPLING AND ANALYSIS SUMMARY SHEET - PAGE 1 of 1

Facility Name: _____

SAMPLING AND ANALYSIS SUMMARY WORKSHEET

	Activity	Worksheet Number	Cost ($)
1.	Drilling and Subsurface Soil Sampling & Analysis	CB-10B	
2.	Concrete Core Sampling & Analysis	CB-10C	
3.	Wipe Sampling & Analysis	CB-10D	
4.	Surface Water/Liquid Sampling & Analysis	CB-10E	
5.	Soil/Sludge/Sediment Sampling & Analysis	CB-10F	
TOTAL SAMPLING AND ANALYSIS COST ***(Add lines 1 through 5)*** ***(Enter total on Worksheet CB-1, line 8)***			**$**

SAMPLE INVENTORY - Page 1 of 2

The information entered on this inventory worksheet will be used in completing the appropriate cost estimating worksheets to determine the cost of sampling and analysis during closure. Depending on the types of samples to be collected and analyzed, it may not be necessary to complete all sections of this inventory worksheet.

1 NUMBER OF DRILLING AND SUBSURFACE SOIL SAMPLES

In the space below, identify the number of boreholes and the number of subsurface soil samples per borehole to be collected for each individual unit. Record the total number of samples to be collected in the box provided.

1	**Number of Subsurface Soil Samples** **Boring Diameter:**	**boreholes**	**samples/borehole**	**total samples**

2 NUMBER OF CONCRETE CORE SAMPLES

In the space below, identify the number of concrete core samples to be collected for each individual unit. Record the total number of samples to be collected in the box provided.

2	**Number of Concrete Core Samples**	**samples**

3 NUMBER OF WIPE SAMPLES

In the space below, identify the number of sample locations and the number of wipe samples per location to be collected for each individual unit. Record the total number of samples to be collected in the box provided.

3	**Number of Wipe Samples**	**locations**	**samples/location**	**total samples**

4 NUMBER OF SURFACE WATER/LIQUID SAMPLES

In the space below, identify the number of grab samples to be taken from lakes, rivers, or ponds and samples to be taken of liquid wastes such as rinsate and surface water. Record the total number of samples to be collected in the box provided.

4	**Number of Aqueous Samples**	**locations**	**samples/location**	**total samples**

5 NUMBER OF SOIL/SLUDGE/SEDIMENT SAMPLES

In the space below, identify the number of grab samples to be taken of surface soil, sludge, sediment, or concrete chips and the number of soil/sludge/sediment samples per location to be collected for each individual unit. Record the total number of samples to be collected in the box provided.

5	**Number of Nonaqueous Samples**			
		locations	**samples/location**	**total samples**

Use this worksheet to estimate the cost of collecting samples of subsurface soil or rock. This worksheet assumes the use of a drill rig or other mechanical equipment to bore or core soil and rock, by various drilling methods.

1	**COLLECTING SUBSURFACE SOIL SAMPLES - 2-1/2-INCH-DIAMETER BOREHOLE**		
1.A	Number of boreholes to be drilled (Enter from Worksheet CB-10A, line 1)	boreholes	
1.B	Total depth of all boreholes (Add all depths. If the depths are not known, estimate the average depth of the boreholes to be drilled and multiply the estimated depth by line 1.A)	ft	
1.C	Level of PPE assumed for this activity (protection level D, C, or B)[a]	level of PPE	
1.D	Labor and equipment cost per work hour[b]	$ /work hr	
1.E	Work rate to drill 2-1/2-inch-diameter hole[c]	work hr/ft	
1.F	Number of hours required to drill total depth of 2-1/2-inch-diameter holes (Multiply line 1.B by line 1.E) (One hour minimum; round up to the half-hour)	work hrs	
1.G	**Cost to Drill 2-1/2-inch Borings (Multiply line 1.D by line 1.F)**		**$**
2	**COLLECTING SUBSURFACE SOIL SAMPLES - 4-INCH-DIAMETER BOREHOLE**		
2.A	Number of boreholes to be drilled (Enter from worksheet CB-10A, line 1)	boreholes	
2.B	Total depth of all boreholes (Add all depths. If the depths are not known, estimate the average depth of the boreholes to be drilled and multiply the estimated depth by line 2.A)	ft	
2.C	Level of PPE assumed for this activity (protection level D, C, or B)[a]	level of PPE	
2.D	Labor and equipment cost per work hour[b]	$ /work hr	
2.E	Work rate to drill 4-inch-diameter hole[d]	work hr/ft	
2.F	Number of work hours required to drill total depth of 4-inch-diameter holes (Multiply line 2.B by line 2.E) (One hour minimum; round up to the half-hour)	work hrs	
2.G	**Cost to Drill 4-inch Borings (Multiply line 2.D by line 2.F)**		**$**

3	**ANALYZING SUBSURFACE SOIL SAMPLES**		
3.A	Determine the cost of analysis per sampling event for subsurface soil samples (Enter from Page 3 of 3 of this worksheet)	$ /event	
3.B	Number of sampling events	events	
3.C	**Cost to Analyze Subsurface Soil Samples (Multiply line 3.A by line 3.B)**		**$**
	TOTAL COST OF COLLECTION AND ANALYSIS OF SUBSURFACE SOIL SAMPLES (Add lines 1.G, 2.G, and 3.C) (Enter total on Worksheet CB-10, line 1)		**$**

Notes:

[a] Because workers who are encumbered by health and safety equipment cannot perform activities as quickly as workers who are not so encumbered, requirements for higher levels of PPE will reduce the productivity of labor and equipment. PPE requirements therefore should be taken into account in determining the work rate and the total number of hours needed to conduct this activity.

[b] Enter the estimated cost per work hour of all labor and equipment needed to collect boring and subsurface soil samples. Costs may vary significantly depending upon the method of drilling to be used.

[c] Enter the estimated number of work hours per foot required to drill a 2½-inch-diameter hole and collect subsurface soil samples. If, for example, it is estimated that it will take 45 minutes per foot to drill a 2½-inch-diameter hole and collect a sample, enter a work rate of 0.750 (45 divided by 60) for conducting those activities. The work rate should account for the time required to mobilize equipment; collect, handle, and pack the samples; and decontaminate the sampling team and all its sampling equipment. If an estimate of the total number of hours required to drill 2½-inch-diameter holes and collect subsurface soil samples has already bee formulated, you may bypass this step and enter that number directly on line 1.F.

[d] Enter the estimated number of work hours per foot required to drill a 4-inch-diameter hole and collect subsurface soil samples. If, for example, it is estimated that it will take 45 minutes per foot to drill a 4-inch-diameter hole and collect a sample, enter a work rate of 0.750 (45 divided by 60) for drilling the hole. The work rate should account for the time required to mobilize equipment; collect, handle, and pack the samples; and decontaminate the sampling team and all sampling equipment. If an estimate of the total number of hours required to drill 4-inch holes and collect subsurface soil samples has already been formulated, you may bypass this step and enter that number directly on line 2.F.

Estimated Analytical Cost per Sampling Event
Reference for Line 3.A

Column 1 Analytical Parameter and Method	Column 2 Cost of Analysis ($) per Parameter	Column 3 Number of Analyses, including QC Analyses[a]	Column 4 Total Cost of Analysis ($) per Parameter per Event (Multiply Column 2 by Column 3)
TOTAL COST OF ANALYZING SUBSURFACE SOIL SAMPLES (Sum of all costs in Column 4)			**$ /event**

Notes:

[a] *Determine the total number of samples to be analyzed at the time of closure. The number of quality control (QC) samples typically is estimated at 20 percent of the total number of samples to be analyzed.*

Coring may be necessary to collect samples from hard surfaces, such as concrete.

1	**COLLECTING CONCRETE CORE SAMPLES**		
1.A	Number of concrete core samples to be collected (Enter from Worksheet CB-10A, line 2)	core samples	
1.B	Level of PPE assumed for this activity (protection level D, C, or B)[a]	level of PPE	
1.C	Labor and equipment cost per work hour[b]	$	
1.D	Work rate to drill a 3-inch-diameter core sample boring to a depth of 6 inches[c]	work hr/sample	
1.E	Number of hours required to drill 3-inch-diameter borings (Multiply line 1.A by Line 1.D) (One hour minimum; round up to the half-hour)	work hrs	
1.F	**Cost to Collect Concrete Core Samples (Multiply line 1.C by line 1.E)**		**$**
2	**ANALYZING CONCRETE CORE SAMPLES**		
2.A	Determine the cost of analysis per sampling event for concrete core samples (Enter from Page 2 of 2 of this worksheet)	$ /event	
2.B	Enter the number of sampling events	events	
2.C	**Cost to Analyze Concrete Core Samples (Multiply line 2.A by line 2.B)**		**$**
	TOTAL COST OF COLLECTION AND ANALYSIS OF CONCRETE CORE SAMPLES (Add lines 1.F and 2.C) (Enter total on Worksheet CB-10, line 2)		**$**

Notes:

[a] *Because workers encumbered by health and safety equipment cannot perform activities as quickly as workers who are not so encumbered, requirements for higher levels of PPE will reduce the productivity of labor and equipment. PPE requirements therefore should be taken into account in determining the work rate and the total number of hours required to conduct this activity.*

[b] Enter the estimated cost per work hour of all labor and equipment needed to collect concrete core samples.

[c] Enter the estimated number of work hours required to drill one 3-inch diameter core sample boring to a depth of 6 inches. If, for example, it is estimated that it will take 45 minutes to drill one 3-inch diameter core sample boring, enter a work rate of 0.750 (45 divided by 60) for conducting that activity. *The work rate should account for the time required to mobilize equipment; collect, handle, and pack the samples; and decontaminate the sampling team and all its sampling equipment.* If an estimate of the total number of hours required to drill 3-inch-diameter core sample borings has already been formulated, you may bypass this step and enter that number directly on line 1.E.

Estimated Analytical Cost per Sampling Event
Reference for Line 2.A

Column 1 Analytical Parameter and Method	Column 2 Cost of Analysis ($) per Parameter	Column 3 Number of Analyses, including QC Analyses[a]	Column 4 Total Cost of Analysis ($) per Parameter per Event (Multiply Column 2 by Column 3)
TOTAL COST OF ANALYZING CONCRETE CORE SAMPLES (Sum of all costs in Column 4)			**$ /event**

Notes:

[a] Determine the total number of samples to be analyzed at the time of closure. The number of QC samples typically is estimated at 20 percent of the total number of samples to be analyzed.

Wipe samples often are used to assess the presence or extent of contamination on hard, relatively nonporous surfaces. In general, wipe sampling is used only when the contaminant of concern has a heavy, persistent characteristic, meaning it does not easily volatilize or leave the surface being sampled.

1 COLLECTING WIPE SAMPLES			
1.A	Number of wipe samples to be collected (Enter from worksheet CB-10A, line 3)	samples	
1.B	Level of PPE assumed for this activity (protection level D, C, or B)[a]	level of PPE	
1.C	Labor and equipment cost per work hour[b]	$	
1.D	Work rate required to collect one sample[c]	work hr/sample	
1.E	Number of hours required to collect all samples (Multiply line 1.A by line 1.D)	work hrs	
1.F	**Cost to Collect Wipe Samples (Multiply line 1.C by line 1.E)**		**$**
2 ANALYZING WIPE SAMPLES			
2.A	Cost of analysis per sampling event for wipe samples (Enter from Page 2 of 2 of this worksheet)	$ /event	
2.B	Number of sampling events	events	
2.C	**Cost to Analyze Wipe Samples (Multiply line 2.A by line 2.B)**		**$**
TOTAL COST OF COLLECTION AND ANALYSIS OF WIPE SAMPLES (Add lines 1.F and 2.C) (Enter total on Worksheet CB-10, line 3)			**$**

Notes:

[a] *Because workers encumbered by health and safety equipment cannot perform activities as quickly as workers who are not so encumbered, requirements for higher levels of PPE will reduce the productivity of labor and equipment. PPE requirements therefore should be taken into account in determining the work rate and the total number of hours required to conduct this activity.*

[b] Enter the estimated cost per work hour of all labor and equipment needed to collect wipe samples.

[c] Enter the estimated number of work hours required to collect one wipe sample. If, for example, it is estimated that it will take 10 minutes per sample to collect wipe samples, enter a work rate of 0.167 (10 divided by 60) for collecting the samples. *The work rate should account for the time required to mobilize equipment; collect, handle, and pack the samples; and decontaminate the sampling team and all sampling equipment.* If an estimate of the total number of hours required to collect wipe samples has already been formulated, you may bypass this step and enter that number directly on line 1.E.

Estimated Analytical Cost per Sampling Event
Reference for Line 2.A

Column 1 Analytical Parameter and Method	Column 2 Cost of Analysis ($) per Parameter	Column 3 Number of Analyses, including QC Analyses[a]	Column 4 Total Cost of Analysis ($) per Parameter per Event (Multiply Column 2 by Column 3)
TOTAL COST OF ANALYZING WIPE SAMPLES (Sum of all costs in Column 4)			**$ /event**

Notes:

[a] *Determine the total number of samples to be analyzed at the time of closure. The number of QC samples typically is estimated at 20 percent of the total number of samples to be analyzed.*

Surface water/liquid samples are grab samples taken from lakes, rivers, or ponds and samples taken of liquid wastes such as rinsate and wastewater. This worksheet is not to be used to estimate the cost of sampling and analyzing other aqueous media, such as groundwater.

1 COLLECTING SURFACE WATER.LIQUID SAMPLES			
1.A	Number of surface water/liquid samples to be collected (Enter from Worksheet CB-10A, line 4)	samples	
1.B	Level of PPE assumed for this activity (protection level D, C, or B)[a]	level of PPE	
1.C	Labor and equipment cost per work hour[b]		
1.D	Work rate required to collect one sample[c]	work hr/sample	
1.E	Number of hours required to collect all samples (Multiply line 1.A by line 1.D)	work hrs	
1.F	**Cost to Collect Surface Water/Liquid Samples (Multiply line 1.C by line 1.E)**		**$**
2 ANALYZING SURFACE WATER/LIQUID SAMPLES			
2.A	Cost of analysis per sampling event for surface water/liquid samples (Enter from Page 2 of 2 of this worksheet)	$ /event	
2.B	Enter the number of sampling events	events	
2.C	**Cost to Analyze Surface Water/Liquid Samples (Multiply line 2.A by line 2.B)**		**$**
	TOTAL COST OF COLLECTION AND ANALYSIS OF SURFACE WATER/LIQUID SAMPLES (Add lines 1.F and 2.C) (Enter total on Worksheet CB-10, line 4)		**$**

Notes:

[a] *Because workers encumbered by health and safety equipment cannot perform activities as quickly as workers who are not so encumbered, requirements for higher levels of PPE will reduce the productivity of labor and equipment. PPE requirements therefore should be taken into account in determining the work rate and the total number of hours required to conduct this activity.*

[b] Enter the estimated cost per work hour of all labor and equipment needed to collect surface water/liquid samples.

[c] Enter the estimated number of work hours required to collect one surface water/liquid sample. If, for example, it is estimated that it will take 10 minutes per sample to collect surface water/liquid samples, enter a work rate of 0.167 (10 divided by 60) for collecting the samples. *The work rate should account for the time required to mobilize equipment; collect, handle, and pack the samples; and decontaminate the sampling team and all sampling equipment.* If an estimate of the total number of hours required to collect surface water/liquid samples has already been formulated, you may bypass this step and enter that number directly on line 1.E.

Estimated Analytical Cost per Sampling Event
Reference for Line 2.A

Column 1 Analytical Parameter and Method	Column 2 Cost of Analysis ($) per Parameter	Column 3 Number of Analyses, including QC Analyses[a]	Column 4 Total Cost of Analysis ($) per Parameter per Event (Multiply Column 2 by Column 3)
TOTAL COST OF ANALYZING SURFACE WATER/LIQUID SAMPLES (Sum of all costs in Column 4)			**$ /event**

Notes:

[a] *Determine the total number of samples to be analyzed at the time of closure. The number of QC samples typically is estimated at 20 percent of the total number of samples to be analyzed.*

Soil/sludge/sediment samples are grab samples of surface soil, sludge, sediment, or concrete chips. Such samples are shallow samples, that is, they are typically collected at depths of less than 1.5 feet below the ground surface.

1	**COLLECTING SOIL/SLUDGE/SEDIMENT SAMPLES**		
1.A	Number of soil/sludge/sediment samples to be collected (Enter from Worksheet CB-10A, line 5)	samples	
1.B	Level of PPE assumed for this activity (protection level D, C, or B)[a]	level of PPE	
1.C	Labor and equipment cost per work hour[b]	$	
1.D	Work rate required to collect one sample[c]	work hr/sample	
1.E	Number of hours required to collect all samples (Multiply line 1.A by line 1.D)	work hrs	
1.F	**Cost to Collect Soil/Sludge/Sediment Samples (Multiply line 1.C by line 1.E)**		**$**
2	**ANALYZING SOIL/SLUDGE/SEDIMENT SAMPLES**		
2.A	Cost of analysis per sampling event for soil/sludge/sediment samples (Enter from Page 2 of 2 of this worksheet)	$ /event	
2.B	Number of sampling events	events	
2.C	**Cost to Analyze Soil/Sludge/Sediment Samples (Multiply line 2.A by line 2.B)**		**$**
	TOTAL COST OF COLLECTION AND ANALYSIS OF SOIL/SLUDGE/SEDIMENT SAMPLES (Add lines 1.F and 2.C) (Enter total on Worksheet CB-10, line 5)		**$**

Notes:

[a] *Because workers encumbered by health and safety equipment cannot perform activities as quickly as workers who are not so encumbered, requirements for higher levels of PPE will reduce the productivity of labor and equipment. PPE requirements therefore should be taken into account in determining the work rate and the total number of hours required to conduct this activity.*

[b] Enter the estimated cost per work hour of all labor and equipment needed to collect soil/sludge/sediment samples.

[c] Enter the estimated number of work hours required to collect one soil/sludge/sediment sample. If, for example, it is estimated that it will take 10 minutes per sample to collect soil/sludge/sediment samples, enter a work rate of 0.167 (10 divided by 60) for collecting the samples. *The work rate should account for the time required to mobilize equipment; collect, handle, and pack the samples; and decontaminate the sampling team and all sampling equipment.* If an estimate of the total number of hours required to collect soil/sludge/sediment samples has already been formulated, you may bypass this step and enter that number directly on line 1.E.

Estimated Analytical Cost per Sampling Event
Reference for Line 2.A

Column 1 Analytical Parameter and Method	Column 2 Cost of Analysis ($) per Parameter	Column 3 Number of Analyses, including QC Analyses[a]	Column 4 Total Cost of Analysis ($) per Parameter per Event (Multiply Column 2 by Column 3)
TOTAL COST OF ANALYZING SOIL/SLUDGE/SEDIMENT SAMPLES (Sum of all costs in Column 4)			**$ /event**

Notes:

[a] *Determine the total number of samples to be analyzed at the time of closure. The number of QC samples typically is estimated at 20 percent of the total number of samples to be analyzed.*

Depending on the activities being conducted, it may not be necessary to complete all sections of this worksheet.

1	**TRANSPORTATION OF DRUMMED WASTE**		
1.A	Number of drums of waste	drums	
1.B	Cost to transport one truckload of 55-gallon drums to the nearest treatment or disposal facility that will accept the waste	$ /truckload	
1.C	Number of truckloads needed to transport waste in drums (Divide line 1.A by 80 drums per truckload; round up to the nearest whole number)	truckloads	
1.D	**Cost to Transport Waste In Drums (Multiply line 1.B by line 1.C)**		**$**
2	**TRANSPORTATION OF BULK LIQUIDS**		
2.A	Gallons of liquid waste	gal	
2.B	Cost to transport one truckload of bulk liquids to the nearest treatment or disposal facility that will accept the waste	$ /truckload	
2.C	Number of truckloads needed to transport bulk free liquid waste (Divide line 2.A by 6,900 gallons per truckload; round up to the nearest whole number)	truckloads	
2.D	**Cost to Transport Bulk Liquid Waste (Multiply line 2.B by line 2.C)**		**$**
3	**TRANSPORTATION OF BULK WASTE**		
3.A	Number of waste debris boxes	debris boxes	
3.B	Cost to transport one truckload of bulk waste to the nearest treatment or disposal facility that will accept the waste	$ /truckload	
3.C	**Cost to Transport Bulk Solid Waste (assume one debris box can be hauled on each truck) (Multiply line 3.A by line 3.B)**		**$**
	TOTAL COST TO TRANSPORT WASTE (Add lines 1.D, 2.D, and 3.C) (Enter total on Worksheet CB-1, line 9)		**$**

TREATMENT AND DISPOSAL SUMMARY SHEET - Page 1 of 1

Facility Name: _____

SUMMARY WORKSHEET

	Activity	Worksheet Number	Cost ($)
1.	Treatment and Disposal of Waste	CB-12A	
2.	Transportation and Disposal of Decontamination Fluids	CB-12B	
TOTAL COST OF TREATMENT AND DISPOSAL *(Add lines 1 and 2)* *(Enter total on Worksheet CB-1, line 10)*			**$**

1	**TREATMENT AND DISPOSAL OF WASTE 1**		
1.A	Volume of waste in yd^3 to be treated or disposed of (If the waste is not recorded in yd^3, use the factors in Table 1 of this worksheet to convert to yd^3)	yd^3	
1.B	Number of pounds per yd^3 of waste (Select from Table 2 of this worksheet the density of material that most closely resembles the density of the waste to be treated or disposed of)	lb/yd^3	
1.C	Amount in lbs of waste to be treated and disposed of (Multiply line 1.A by line 1.B)	lb	
1.D	Amount in tons of waste to be treated and disposed of (Divide line 1.C by 2,000)	tons	
1.E	Treatment and disposal cost per ton	$ /ton	
1.F	**Cost to Treat and Dispose of Waste 1 (Multiply line 1.D by line 1.E)**		**$**
2	**TREATMENT AND DISPOSAL OF WASTE 2**		
2.A	Volume of waste in yd^3 to be treated or disposed of (If the waste is not recorded in yd^3, use the factors in Table 1 of this worksheet to convert to yd^3)	yd^3	
2.B	Number of pounds per yd^3 of waste (Select from table 2 of this worksheet the density of material that most closely resembles the density of the waste to be treated or disposed of)	lb/yd^3	
2.C	Amount in lbs of waste to be treated and disposed of (Multiply line 2.A by line 2.B)	lb	
2.D	Amount in tons of waste to be treated and disposed of (Divide line 2.C by 2,000)	tons	
2.E	Treatment and disposal cost per ton	$ /ton	
2.F	**Cost to Treat and Dispose of Waste 2 (Multiply line 2.D by line 2.E)**		**$**

3	**TREATMENT AND DISPOSAL OF WASTE 3**		
3.A	Volume of waste in yd^3 to be treated or disposed of (If the waste is not recorded in yd^3, use the factors in Table 1 of this worksheet to convert to yd^3)	yd^3	
3.B	Number of pounds per yd^3 of waste (Select from table 2 of this worksheet the density of material that most closely resembles the density of the waste to be treated or disposed of)	lb/yd^3	
3.C	Amount in lbs of waste to be treated and disposed of (Multiply line 3.A by line 3.B)	lb	
3.D	Amount in tons of waste to be treated and disposed of (Divide line 3.C by 2,000)	tons	
3.E	Treatment and disposal cost per ton	$ /ton	
3.F	**Cost to Treat and Dispose of Waste 3 (Multiply line 3.D by line 3.E)**		**$**
4	**TREATMENT AND DISPOSAL OF WASTE 4**		
4.A	Volume of waste in yd^3 to be treated or disposed of (If the waste is not already in yd^3, use the factors on Table 1 of this worksheet to convert to yd^3)	yd^3	
4.B	Determine the number of pounds per yd^3 of waste (Select from Table 2 of this worksheet the density of material that most closely resembles the density of the waste to be treated or disposed of)	lb/yd^3	
4.C	Amount in lbs of waste to be treated and disposed of (Multiply line 4.A by line 4.B)	lb	
4.D	Amount in tons of waste to be treated and disposed of (Divide line 4.C by 2,000)	tons	
4.E	Treatment and disposal cost per ton	$ /ton	
4.F	**Cost to Treat and Dispose of Waste 4 (Multiply line 4.D by line 4.E)**		**$**
	TOTAL COST OF TREATMENT AND DISPOSAL (Add lines 1.F, 2.F, 3.F, and 4.F) (Enter total on Worksheet CB-12, line 1)		**$**

Table 1
Volume Conversion Factors

Volume: To Convert	Multiply By	To Obtain
Gallons	4.951×10^{-3}	Cubic yards
Cubic feet	27	Cubic yards
Liters	1.31×10^{-3}	Cubic yards
Cubic meters	1.308	Cubic yards

Table 2
Bulk Densities[a]

Bulk Densities of Selected Materials	
Material	**Bulk Density or Range (lb/yd^3)**
Water	1,685.8
Sludge	1,620 - 2,430
Soil[b]	2,025 - 3,240
Cement[c]	4,050
Demolition rubble	2,430 - 3,240
Steel[c]	13,230

Notes:

[a] Densities are derived from the U.S. Environmental Protection Agency's Office of Solid waste and Emergency Response (OSWER) Policy Directive #9476.00-6, 1987.

[b] Soils rich in organic matter and soils that have large amounts of fine particles have lower bulk density than soils poor in organic matter and rich in sand particles.

[c] Densities are derived from Standard Handbook for Civil Engineering, 3rd Edition, 1983.

If the amount of decontamination fluids generated during closure exceeds a volume that can be handled effectively by placing the waste in drums, such fluids may be handled and disposed of as a bulk liquid. This worksheet may be used to determine the cost to transport and dispose of wastewater generated during closure as a bulk hazardous liquid.

1	Volume of decontamination fluid generated from closure activities. Add all volumes calculated for closure activity worksheets to determine the total volume of liquid to be transported and disposed of. _____ gal _____ gal _____ gal _____ gal _____ gal	total gal	
2	Level of PPE assumed for this activity (protection level D, C, or B)[a]	level of PPE	
3	Labor and equipment cost per work hour[b]	$	
4	Work rate to pump decontamination fluid to a holding tank (per gallon)[c]	work hrs/gallon	
5	Number of hours required to pump decontamination fluid to a holding tank (Multiply line 1 by line 3) (One hour minimum; round up to the half-hour)	work hours	
6	Subtotal of labor and equipment cost to pump decontamination fluid to a holding tank (multiply line 3 by line 5)		$
7	Number of days of rental of holding tank (Round up line 5 to nearest 8 hours; divide by 8 hours per day)	days	
8	Holding tank rental fee (10,000 gallon capacity) (flat rate per tank per day)	$ /day	
9	Number of tanks required (Divide line 1 by 10,000 gallons; round up to the nearest whole number)	tanks	
10	Subtotal of tank rental costs (Multiply lines 7, 8, and 9)		$
11	Removal cost per gallon of bulk liquid[d]	$ /gal	
12	Subtotal of removal cost for bulk liquids (Multiply line 1 by line 11)		$
TOTAL COST TO TRANSPORT AND DISPOSE OF DECONTAMINATION FLUID AS A BULK LIQUID (Add lines 6, 10, and 12) (Enter total on Worksheet CB-12, line 2)			**$**

Notes:

[a] Because workers encumbered by health and safety equipment cannot perform activities as quickly as workers who are not so encumbered, requirements for higher levels of PPE will reduce the productivity of labor and equipment. PPE requirements therefore should be taken into account in determining the work rate and the total number of hours required to conduct each activity.

[b] Enter the estimated cost per work hour of all labor and equipment needed to pump decontamination fluid to a holding tank.

[c] Enter the number of work hours per gallon required to pump decontamination fluid to a holding tank. If, for example, a pump is used that can pump water at a rate of 5,000 gallons per hour, enter a work rate of 0.0002 hours per gallon (60 ÷5,000) ÷60) for conducting the activity. If an estimate of the total number of hours required to pump decontamination fluid to a holding tank has already been formulated, you may bypass this step and enter that number directly on line 5.

[d] Enter the estimated cost per gallon of transporting and disposing of decontamination fluid as a bulk liquid.

1	Number of units requiring certification of closure[a]		
2	Cost of certification of closure per unit[b]	$	
TOTAL COST OF CERTIFICATION OF CLOSURE (Multiply line 1 by line 2) (Enter total on Worksheet CB-1, line 13)			**$**

Notes:

[a] Facilities closing multiple containment buildings in the same manner at the same time should incur a cost for certification of closure only once.

[b] This cost includes the cost of performance of the following activities by a registered professional engineer: 1) reviewing the closure plan, 2) conducting a final closure inspection at the unit, and 3) preparing a certification of closure report.